

भारतीय प्रौद्योगिकी संस्थान पटना  
INDIAN INSTITUTE OF TECHNOLOGY PATNA  
भौतिकी विभाग Department of Physics

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Speaker: Dr Nagarajan Subramaniam, CEO, Xfold Imaging Oy, Finland and Adjunct Faculty IIT Delhi

Date : 8/September/2023 (Friday)

Time: 11am onwards

Venue: R105 (Block 9, Tutorial Block)

**Title of the talk: Nanoplasmonics for Biology Applications**

**Abstract**

I will present my work in the area of nanoplasmonics for bioimaging and diagnostic applications. The focus of the specific area of interest: Surface-enhanced fluorescence imaging of cancer cells, bacteria (mycobacterium), and SARS-CoV-2 viruses.

Fluorescence microscopy is a widely used method for imaging various biological samples. A major limitation of present widefield and confocal fluorescence microscopy is the lack of sensitivity. The resolution of the confocal fluorescence microscope is limited to  $\sim 300$  nm in the focal plane (xy) and  $\sim 600$  nm in the optical axis (z). In my talk, I will present the nanoplasmonic slides designed to enhance the sensitivity of fluorescence microscopy in a close range from the slide surface, in order to better visualize the focal adhesions proteins in cells and single virion. The nanoplasmonic slides significantly enhance the fluorescence signal, thereby improving sensitivity and enabling early diagnosis of diseases.

In the second part of my presentation, I will introduce surface-enhanced coherent anti-stokes Raman scattering (SE-CARS) for lipid imaging. Coherent anti-stokes Raman scattering (CARS) microscopy has been widely used as a label-free tool for visualizing lipids in biological samples. However, a significant challenge in CARS microscopy lies in increasing the detection sensitivity to nanomolar levels or visualizing the plasma membrane. To address this challenge, I will show the nonlinear plasmonic slides specifically designed to enhance the sensitivity of CARS microscopy, enabling visualization of the cell plasma membrane. These nonlinear plasmonic slides offer a new avenue in CARS microscopy imaging with nanomolar sensitivity which holds great potential for making a significant impact on the healthcare industry

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